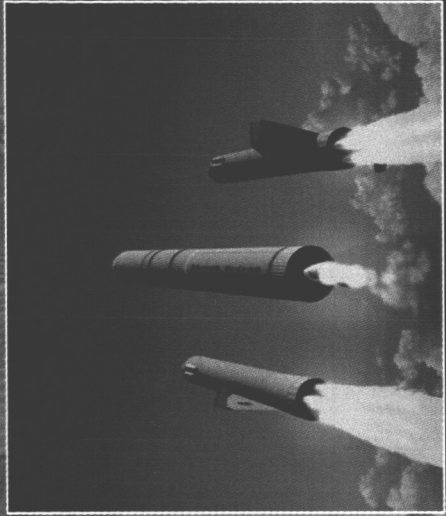
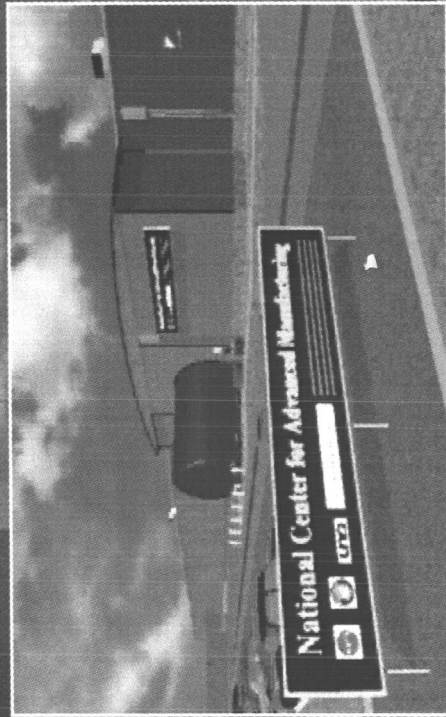
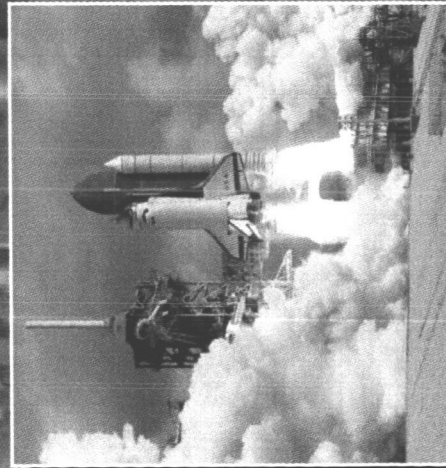




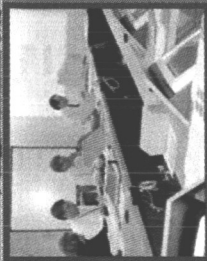
Marshall Space Flight Center Materials and Processes Laboratory

Materials and Processes Laboratory Core Capabilities Overview



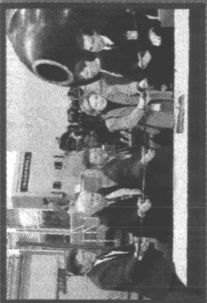


Marshall Space Flight Center Materials and Processes Laboratory



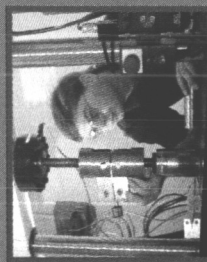
Lab Lead Engineers

- Project Engineering Support
- Materials Selection & Control
- Materials and Processes Technical Information System (MAPTIS)



National Center for Advanced Manufacturing (NCAM)

- Technology Development
- Intelligent Manufacturing
- Emerging Technologies
- Government, Industry, & Academic Collaborations



Materials Test

- Mechanical Test
- Tribology Research
- Analytical & Environmental Chemistry
- Materials Compatibility
- Materials Combustion Research



Damage Tolerance Assessment

- Non-Destructive Evaluation
- Damage Tolerance
- Fracture Control & Analysis



Metals Engineering

- Metallurgical & Failure Analysis
- Welding & Joining Engineering
- Metallic Materials Engineering
- Corrosion & Plating Engineering
- Metallic Materials Development
- Process Engineering



Non-Metals Engineering

- Polymers & Composites
- Ceramics & Ablatives
- Nonmetallic Materials Processing
- Composites Manufacturing
- Process Automation & Modeling



Environmental Effects

- Surface Inspection Technology Applications
- Contamination & Foreign Object Debris Control
- Space Environmental Effects
- Hypervelocity Impact Testing
- Flight Experiments



Marshall Space Flight Center Materials and Processes Laboratory

World Class Facilities

- National Center for Advanced Manufacturing (NCAM)
 - Composite Development Facility
 - Weld Development Laboratories
 - Rapid Prototyping Laboratory
 - Thermal Spray Facility
 - Thermal Protection System Development Facility
 - Nondestructive Evaluation Laboratories
- SEM and Failure Analysis
- Hydrogen Test Facility
- Surface Science Diagnostic Laboratory
- Space Environmental Effects Facility
- Materials Combustion Research Facility



Marshall Space Flight Center Materials and Processes Laboratory

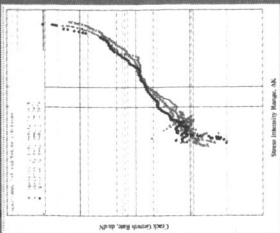
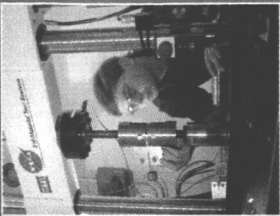
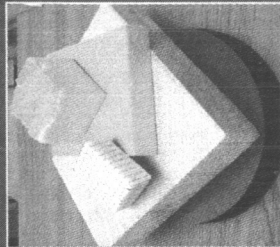
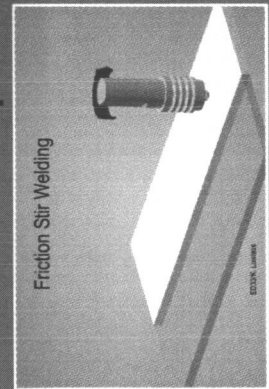
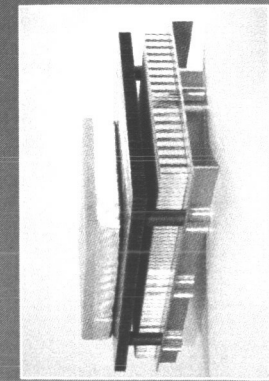
Missions - Support Capabilities

- Tribology Research
- Precision Cleaning And Contamination Control
- Analytical and Environmental Chemistry
- Advanced Materials Development
- Manufacturing Process Development
- Mechanical and Physical Property Testing
- Corrosion Engineering
- Precision Electroplating
- Hypervelocity Impact Testing
- Coatings Development
- Space Environmental Effects (SEE)
- Adhesives / Bonding Process Development
- Sub-scale Rocket Motor Assembly and Component Fabrication
- Elastomeric Material Development
- Materials Selection and Control
- Databases and Specifications
- Environmental Replacement Technology
- Manufacturing Services
- Design and Analysis of Test Hardware and Test Stands
- Ceramic and Metal Matrix Composite Development

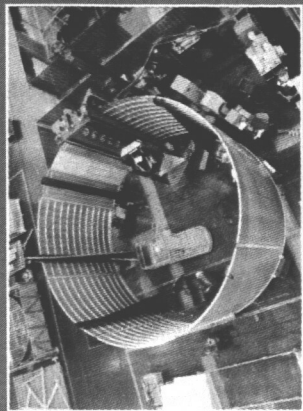
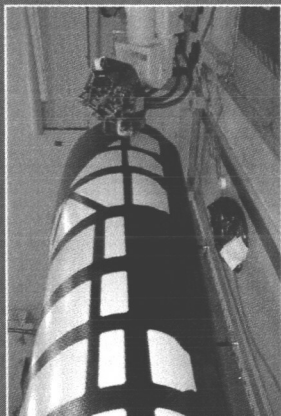
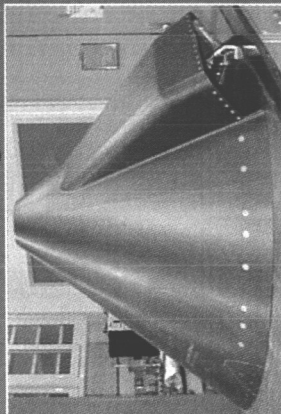
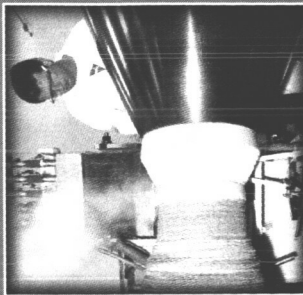


Marshall Space Flight Center Materials and Processes Laboratory

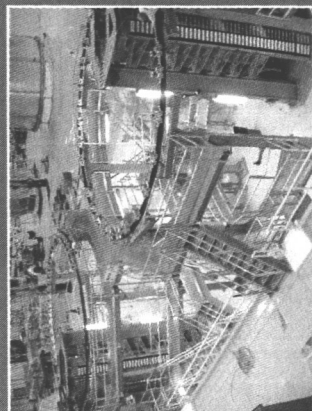
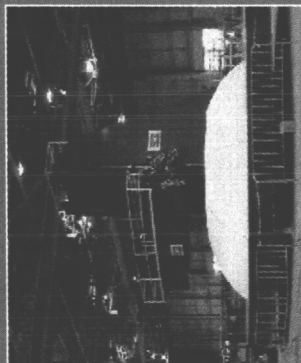
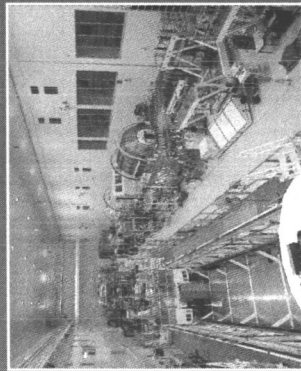
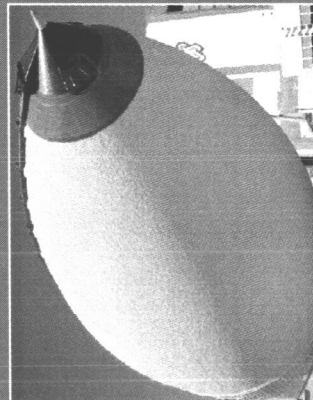
Materials/Processes Development, Characterization and Analysis



Manufacturing Development/Demonstration



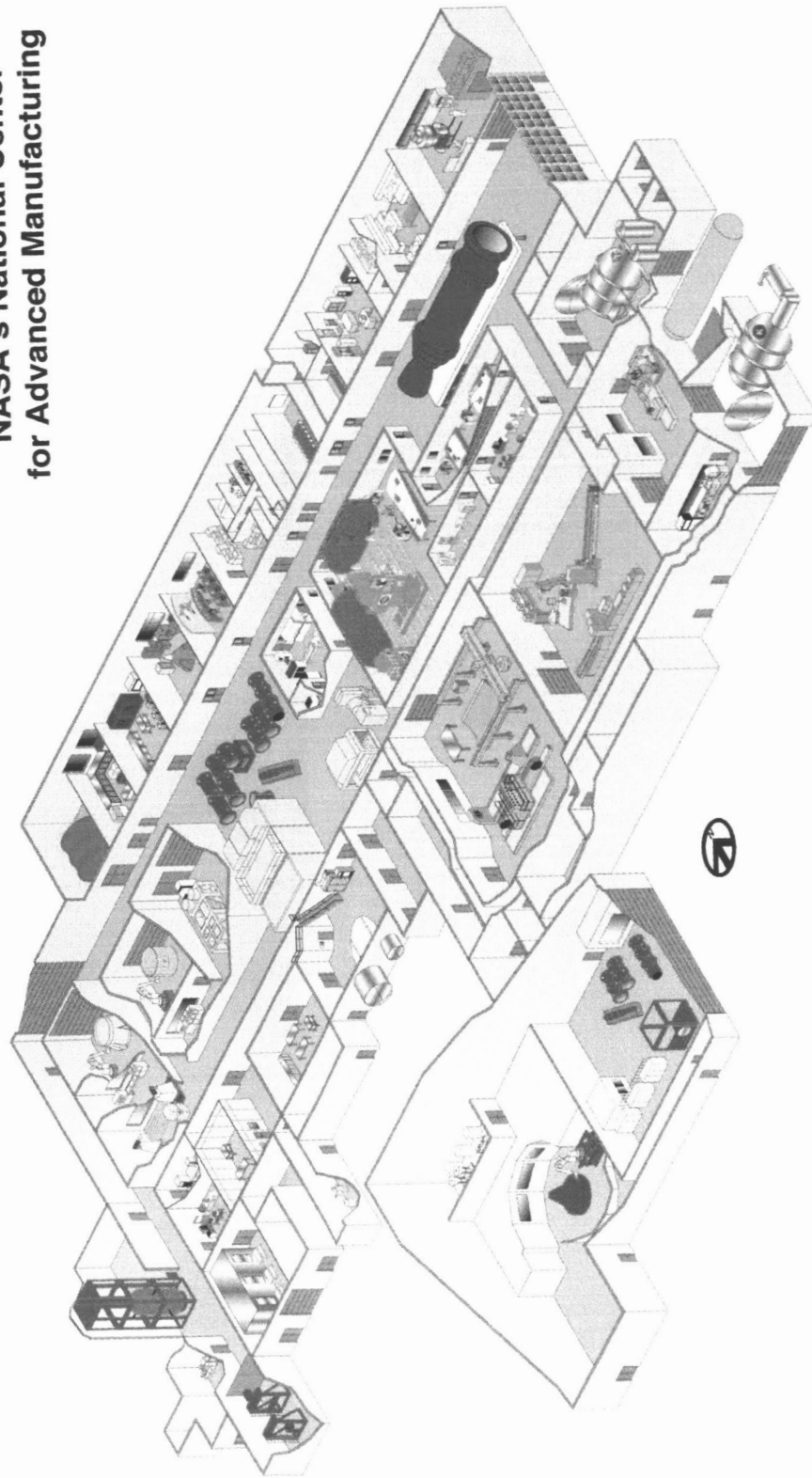
Production Implementation





Marshall Space Flight Center Materials and Processes Laboratory

**NASA's National Center
for Advanced Manufacturing**



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Marshall Space Flight Center Materials and Processes Laboratory

EM03 - Lab Lead Engineers Office

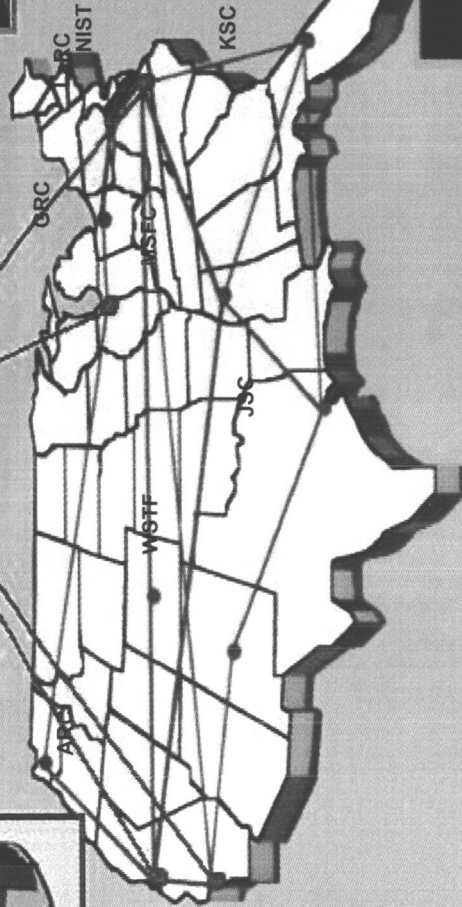
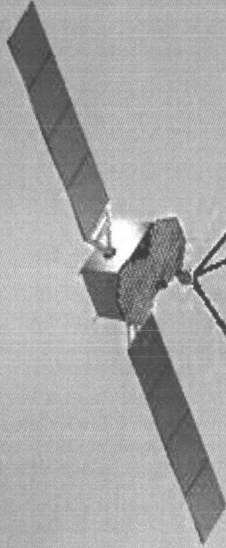
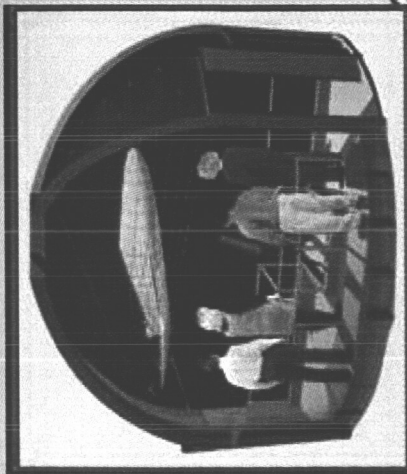
The Lab Lead Engineers Office primarily provides a resource of information on the wide range of applications of materials such as metals, non-metals, and composites for aerospace, defense and manufacturing industry. The group is chartered to maintain a materials and processes data base and improve specifications and standards. This group also provides materials and processes engineering support for all projects that MSFC is involved to aid in requirements definition issue resolution and department resource allocations. This group is responsible for the following areas:

- Project Engineering Support
- Materials Selection & Control
- Materials and Processes Technical Information System (MAPTIS)



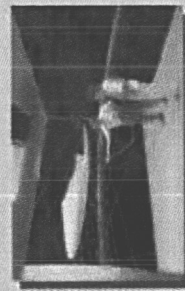
Marshall Space Flight Center Materials and Processes Laboratory

EM03 - Lab Lead Engineers Office



Materials Selection & Control Team Principal Functions:

- Capitalize on Information Technologies for Sustain Decision Support Systems to Select Materials and Processes for Aerospace Applications
- Enable High Fidelity Selection of Materials and Processes Based on a large Knowledge Domain of Materials and Processes Behaviors



Project Support Team Principal Functions:

- Implement NASA Standards to Control Selection of Materials And Processes For Aerospace Applications
- Coordinate Departmental Resources to Assist NASA Product Development



Marshall Space Flight Center Materials and Processes Laboratory

EM10 - Mechanical Test Branch

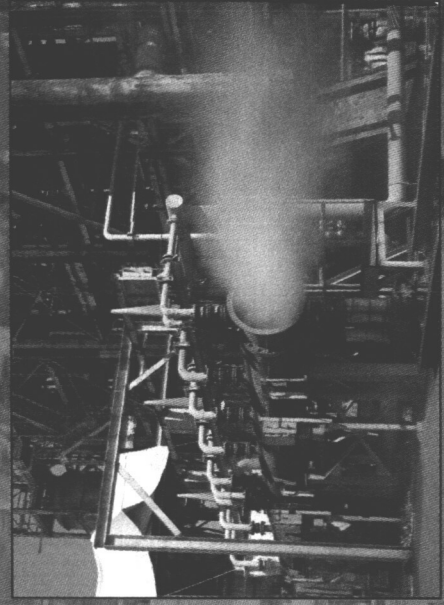
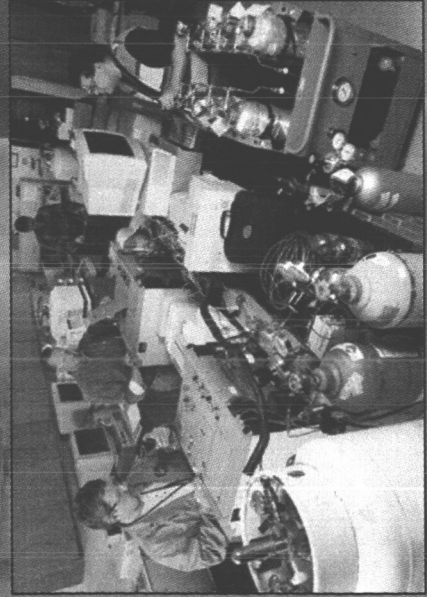
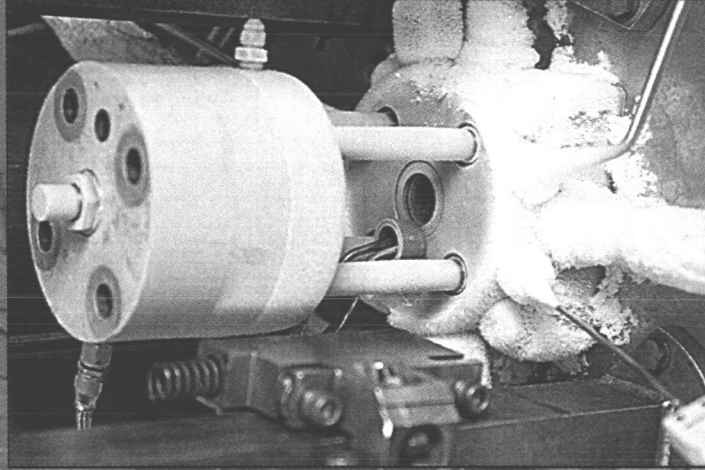
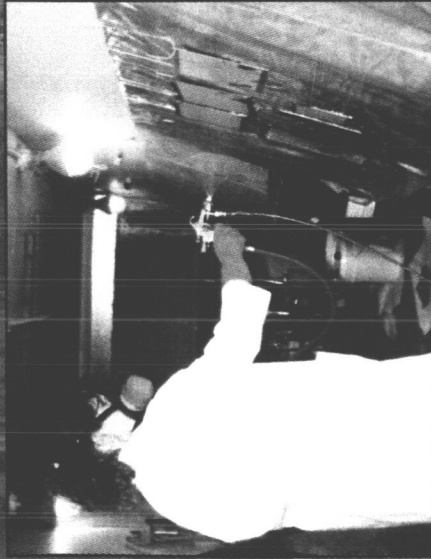
The Mechanical Test Branch primarily generates materials properties data on the wide range of applications of materials such as metals, non-metallics, and composites for aerospace, defense and manufacturing industry. The group is chartered to perform chemical and environmental analysis, materials compatibility testing for gaseous and liquid oxygen service at ambient and high pressures, aerothermal materials testing, and materials replacement technology. This group also pursues replacement chemicals and process technology for those chemicals or processes considered hazardous to the environment. This group is responsible for the following areas:

- Mechanical Test
- Tribology Research
- Analytical & Environmental Chemistry
- Materials Compatibility
- Materials Combustion Research



Marshall Space Flight Center Materials and Processes Laboratory

EM10 - Mechanical Test Branch





Marshall Space Flight Center Materials and Processes Laboratory

EM20 – Damage Tolerance Assessment Branch

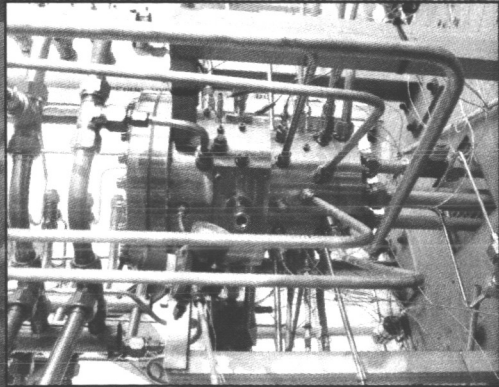
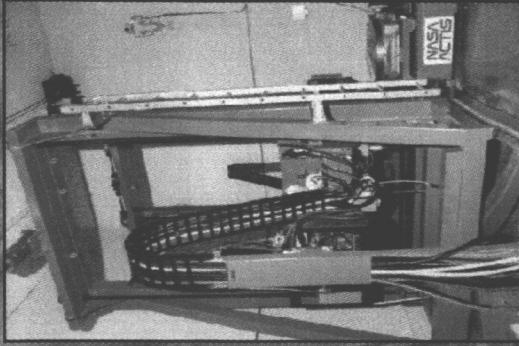
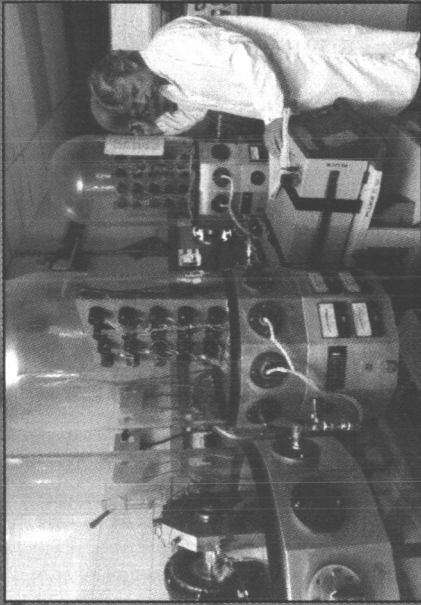
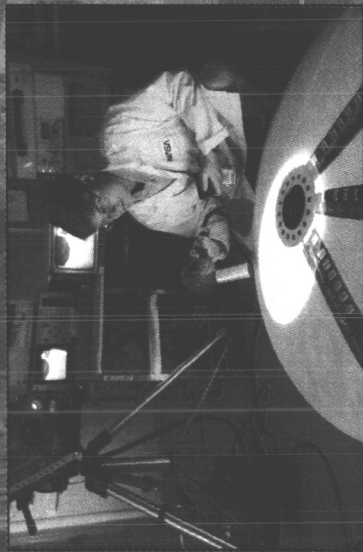
The Damage Tolerance Assessment Branch conducts research to understand the scientific phenomena that lie within both the regimes of space physics and materials science. Applied research is conducted to develop new, nondestructive evaluation (NDE) techniques and to understand lubrication properties of new materials and systems. This group is responsible for the following areas:

- Non-Destructive Evaluation
- Damage Tolerance
- Fracture Control & Analysis



Marshall Space Flight Center Materials and Processes Laboratory

EM20 – Damage Tolerance Assessment Branch





Marshall Space Flight Center Materials and Processes Laboratory

EM30 - Metals Engineering Branch

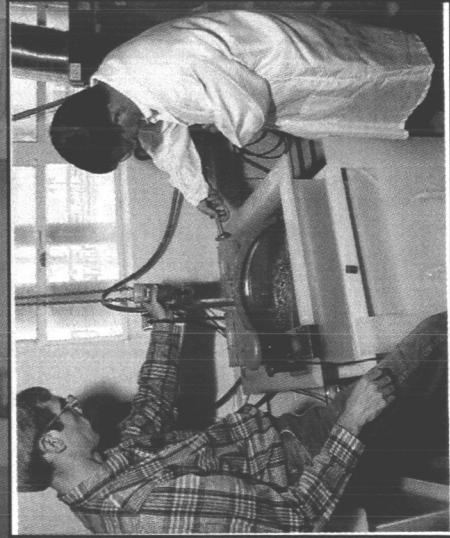
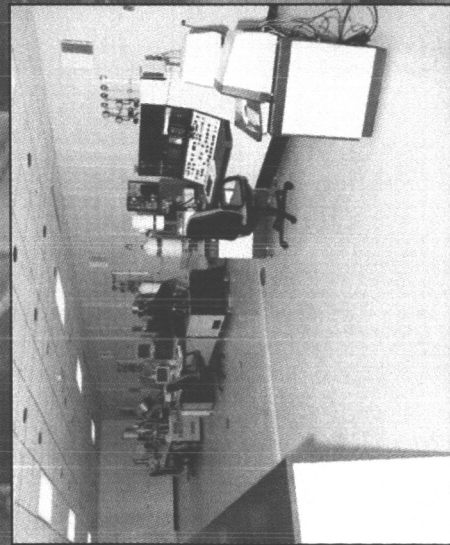
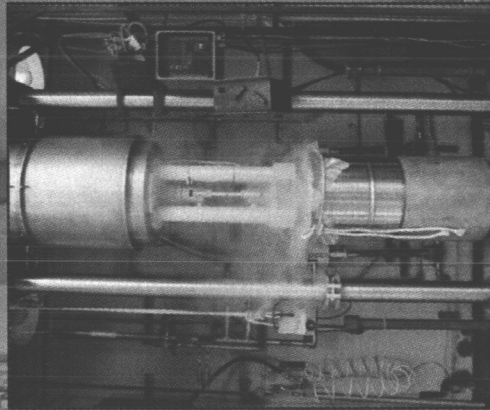
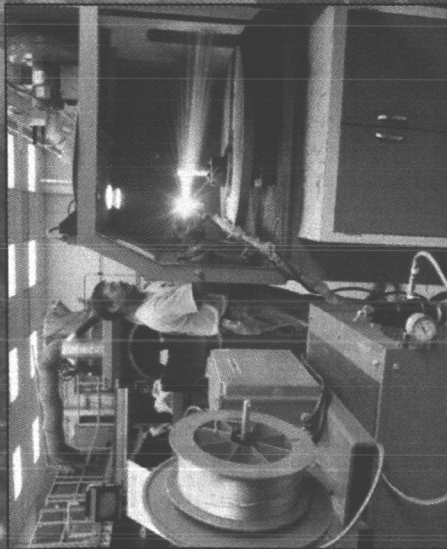
The Metals Engineering Branch utilizes state-of-the-art equipment and highly skilled personnel to perform the wide variety of tasks required to fulfill its mission, which includes materials development, metallurgical analysis, mechanical testing, failure analysis, and process engineering. Commercially available and developmental materials are characterized under standard conditions, and subsequently are tested in specialized environments to determine their suitability for use in space systems. New materials and processes are developed to fill special needs or to improve the performance of existing systems. In the event of a failure, the Metals Engineering Branch is equipped to perform virtually any analysis that is required to determine the cause and to recommend corrective action. This group is responsible for the following areas:

- Metallurgical & Failure Analysis
- Welding & Joining Engineering
- Metallic Materials Engineering
- Corrosion & Plating Engineering
- Metallic Materials Development
- Process Engineering



Marshall Space Flight Center Materials and Processes Laboratory

EM30 - Metals Engineering Branch





Marshall Space Flight Center Materials and Processes Laboratory

EM40 - Nonmetals Engineering Branch

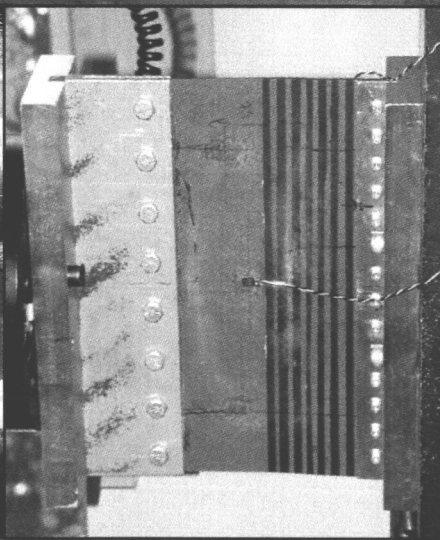
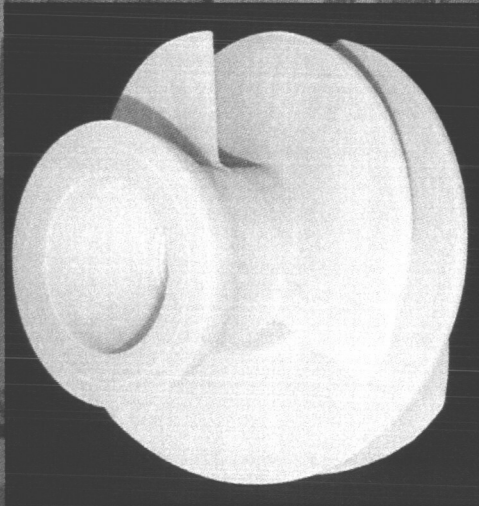
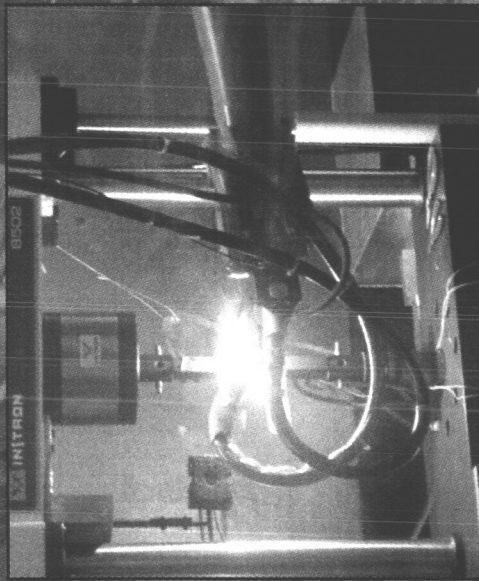
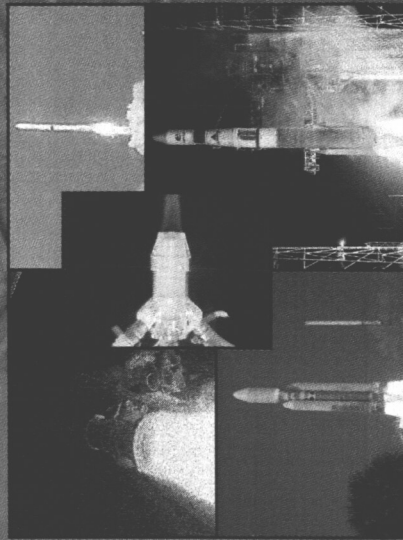
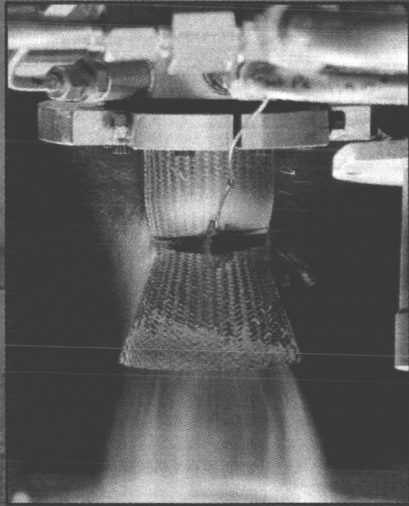
The Nonmetals Engineering Branch conducts applied research using state-of-the-art facilities to develop new and enabling technologies for space vehicles and propulsion systems. The primary focus of the group is to perform research and development (R&D) and to serve as a consulting, performing, and approving activity for relevant aspects of nonmetallic materials technology. Research and development efforts encompass the areas of advanced composites, thermal and cryogenic insulation, structural adhesives, rapid prototyping, optical benches, elastomeric seals, advanced glasses/ceramics, and environmentally-safe material replacements. This group is responsible for the following areas:

- Polymers & Composites
- Ceramics & Ablatives
- Nonmetallic Materials Processing
- Composites Manufacturing
- Process Automation & Modeling



**Marshall Space Flight Center
Materials and Processes Laboratory**

EM40 - Nonmetals Engineering Branch





Marshall Space Flight Center Materials and Processes Laboratory

EM 50 - Environmental Effects Branch

The Environmental Effects Branch conducts research to understand the scientific phenomena that lie within both the regimes of space physics and materials science. Applied research is conducted to develop new, efficient methods of surface cleanliness measurement and contamination control and to characterize materials that can withstand long-term exposure to the space and spacecraft induced environment. This group is responsible for the following areas:

- Surface Inspection Technology Applications
- Contamination & Foreign Object Debris Control
- Space Environmental Effects
- Hypervelocity Impact Testing
- Flight Experiments



Marshall Space Flight Center Materials and Processes Laboratory

EM 50 - Environmental Effects Branch

